Juglans regia in Europe: distribution, habitat, usage and threats

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***Juglans regia* L., commonly known as common, English or Persian walnut, is an economically very important tree species, prized both for its nuts and for its attractive high-quality timber. It is the most widespread nut tree worldwide.**

The common walnut (*Juglans regia* L.) is a large, deciduous tree, reaching a height up to 25-35 m and exceptionally a maximum trunk diameter up to 2 m[1]. It is long-lived: normally 100-200 years, but some specimens may reach 1 000 years old[2]. It has a deep root system, with a substantial tap root starting from the juvenile stage[1, 3]. The bark is silver-grey and smooth between deep, wide fissures[4]. The leaves are 20-45 cm long, with 5 to 9 leaflets, the ones from the apex being larger compared with those from the base of the leaf[4]. Crushed leaves have a scent like shoe-polish[4]. The crown diameter of the common walnut is larger in relation to its stem diameter than any other broadleaf tree species used in Europe[5]. The fruit ripens during hot summers and is a large rounded nut of 4-5 cm and weighing up to 18 g[6]. It may be propagated both by seeds and also vegetatively. It can hybridise and it has been found that the hybrids between common walnut and black walnut (*Juglans nigra*) have good vigour and form[3].

Mature walnut tree with large spreading crown (Bavaria, Germany).
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Distribution

Because of its long history of cultivation, the natural distribution range of this species is not clear[7, 8]. It is thought to be native to the Mediterranean (Southern Europe, Western Asia) and Central Asia[9]; in the latter area the mountains of the West Himalayan chain in the Kashmir, Tajikistan and Kyrgyzstan are considered to be its centre of origin[2]. Fossil evidence, however, shows that in some putative areas of origin in Central Asia such as Kyrgyzstan, the species was introduced for agricultural purposes only 1 000-2 000 years ago[10]. Pollen records and nutshell finds show earliest cultivation in the Mediterranean area; e.g. in Italy around 6 000 years ago and in Anatolia, north-eastern Greece and Croatia around 4 000 years ago[11]. It has been widely cultivated

Fruits ripening on the tree.
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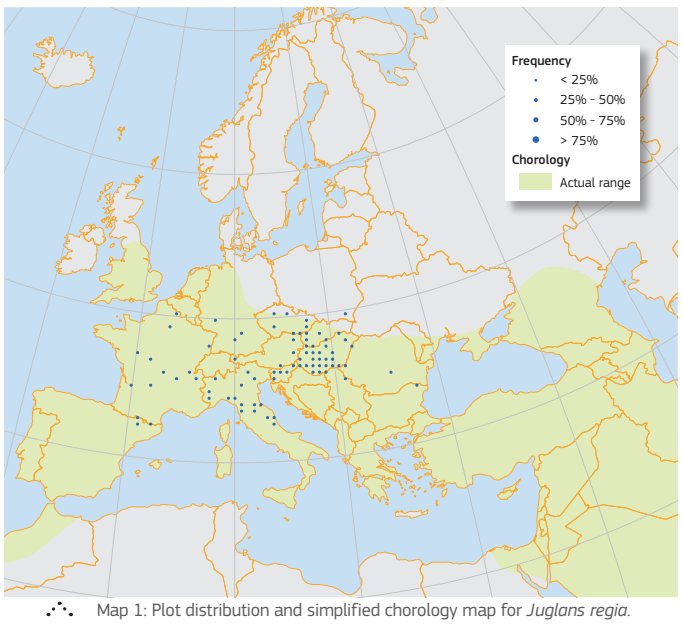

Map 1: Plot distribution and simplified chorology map for *Juglans regia*. Frequency of *Juglans regia* occurrences within the field observations as reported by the National Forest Inventories. The chorology of the actual spatial range for *J. regia* is derived after Fornari *et al.* and the Botanical Society of Britain & Ireland[12, 24].

across the northern hemisphere, and can now be found in most of Europe apart from northerly regions. It is particularly important in Turkey, which is the third largest walnut producer in the world, after China and the United States[6]. It is also grown in India and China, and has been introduced into many other temperate regions of the world, including the Americas, Australia, New Zealand and parts of Africa[7], its distribution ranging nowadays between 10° and 50° northern latitude[12].

Habitat and Ecology

The common walnut is a demanding species and requires special site conditions. Usually grown in pure stands or as individual trees, rather than within mixed woodland, it needs a warm and sheltered site and a long growing season[3, 13]. It also prefers deep and rich soils, with pH values of between 6 and 7.5[1]. It is light-demanding, highly susceptible to competition and sensitive to winter and late spring frosts. Older trees are however able to withstand winter temperatures as low as -30 °C[14]. Germination is improved in mild winters, indicating that a changing climate with warmer winters may prove beneficial to its establishment[14, 15].

Importance and Usage

Walnut is very appreciated for its nuts, which are a highly nutritious food source. They are rich in oil composed of unsaturated fatty acids, proteins, vitamins and minerals. The kernels contain a wide variety of flavonoids, phenolic acids and related polyphenols, which have good antioxidant, anti-atherogenic, anti-inflammatory and anti-mutagenic properties[16]. A diet rich in walnuts is also thought to have a cardiovascular protective effect[17, 18]. Bark or leaf extracts are used worldwide in traditional medicine to treat a variety of conditions[19] including fungal infections such as Candida, to inhibit the growth of bacteria responsible for dental plaques and oral hygiene problems[20], or to increase the insulin level in diabetic patients[21]. The wood of the walnut is highly prized, being strong, attractive and easy to work. Good quality logs are sold for veneer and can command high prices[7]. It is also used in agroforestry[7, 12, 22].

The ripe walnut, emerging from the fruit.
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Male catkins develop in the spring with new leaves.
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Threats and Diseases

The common walnut is sensitive to a number of fungal, bacterial, parasitic and viral diseases. The main fungal agents are *Armillaria mellea, Phytophthora cinamomii* and *P. cambivora* which affect the root system, and antracnosis (*Gnomonia leptostyla*) which causes summer leaf fall[2]. Walnut blight (*Xanthomonas campestris* pv. *juglandis*) is also a serious disease, sometimes causing mortality in young trees[2, 14, 23]. A number of pests target the nuts, reducing the value of the crop; these include the walnut worm (*Cydia pomonella*) and navel orangeworm (*Amyelois transitella*)[7]. Although widespread in its range, the size of local populations is quite limited. Threats to genetic variability could come from felling of the best trees for the high quality timber, and from hybridisation with black walnut (*Juglans nigra*)[2].

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